

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Martin Miller
Telephone Number: (413) 253- 8615
Date: April 10, 2015

- I. **Region: R5 Northeast Region**
II. **Service Activity (Program): Ecological Services**
III. **Pertinent Species and Habitat:**

A. Listed species and/or their critical habitat within the action area:

Federally designated endangered or threatened species within the action area include: the federally threatened piping plover (*Charadrius melodus*), the federally threatened rufa red knot (*Calidris canutus rufa*), the federally endangered roseate tern (*Sterna dougallii dougallii*) and the federally threatened northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*). Critical habitat has not been designated for any of these species.

B. Proposed species and/or proposed critical habitat within the action area:

There are no proposed species or proposed critical habitat present within the action area.

C. Candidate species within the action area:

There are no candidate species present within the action area.

IV. **Geographic area or station name and action:**

Nauset Beach, Town of Orleans, Massachusetts. See section V of the HCP.

V. **Location (attach map):**

- A. **Ecoregion Number and Name:** North Atlantic Coast Ecoregion
B. **County and State:** Barnstable County, Massachusetts
C. **Section, township, and range (or latitude and longitude):** Orleans, Massachusetts
D. **Distance (miles) and direction to nearest town:** varies
E. **Species/habitat occurrence:**
- Piping plovers nest on Nauset Beach.
 - Rufa red knot may be present on Nauset Beach during their northward and southward migrations. Rufa red knot has not been observed in the OSV travel corridor at the Pochet Overwash.
 - The proposed offsite mitigation may occur on piping plover breeding sites used by post-breeding roseate terns and migrating rufa red knot.
 - Northeastern beach tiger beetle does not occur on Nauset Beach and the northern boundary of its known historic range is Chatham, Massachusetts.

VI. **Description of proposed action (attach additional pages as needed):**

The proposed action is the Service's Issuance of a 3-year incidental take permit to the Town of Orleans (Town). The permit will authorize take of piping plovers and issuance is predicated upon the Service's approval of the Town's Habitat Conservation Plan (HCP). The proposed action is fully described in section VI of the attached HCP.

VII. Determination of effects:

- A. Explanation of effects of the action on species and critical habitats in items III A, B and C (attach additional pages as needed):

The only anticipated impacts of the proposed action to piping plovers will occur during implementation of the late season self-escort over-sand-vehicle (OSV) program in accordance with the protocols described in the HCP. Late Season OSV use (beginning on or after July 15th) is likely to result in adverse effects leading to take of unfledged piping plover chicks that may be in the vicinity of the self-escorted vehicles. Adverse effects may include direct mortality due to crushing of unfledged chicks, disturbance, and very transient presence of tire ruts during and between the two daily periods. The covered activities allow for self-escorted OSV travel past up to two broods of four chicks each. Mortality of up to 4 chicks per year, or 12 chicks over the 3-year lifetime of the permit is anticipated. Adult mortality is not anticipated. Refer to section X of the HCP for more information and details.

The proposed action is not likely to adversely affect rufa red knot, roseate tern or Northeastern beach tiger beetle. Rufa red knot may be present on Nauset Beach during their northward or southward migrations; however, they have not been observed in the OSV travel corridor at the Pochet Overwash. In the unlikely event that migrating rufa red knots become present during implementation of the covered activities, the effect of those activities is likely to be insignificant. The proposed offsite mitigation may occur on piping plover breeding sites used by post-breeding roseate terns and migrating rufa red knots, but selective predator management activities to benefit piping plovers are conducted before and during the plover breeding season, such that they are unlikely to occur when roseate terns and their young of the year or southward migrating rufa red knots are present. Practices that are routinely employed by qualified predator management specialists to avoid causing disturbance or other adverse effects to breeding piping plovers will also serve to avoid disturbances to any northward migrating rufa red knots or transient pre-breeding roseate terns that might be present.

The Northeast beach tiger beetle does not occur on Nauset Beach, and the northern boundary of its known range is Chatham, Massachusetts. Light foot traffic, such as would occur during selective predator management, does not adversely affect the species, and predator management activities are otherwise not anticipated to adversely affect Northeastern beach tiger beetles.

- B. Explanation of actions to be implemented to reduce adverse effects:

Minimization and mitigation measures are further explained in sections IX and XI of the HCP.

- Reduction of OSV use from 17 hours per day to 4 hours per day
- Self-escort program to monitor for piping plovers within OSV travel corridor
- Shorebird monitors for each brood to determine location of piping plovers and monitor during use of travel corridor. Travel corridor will not be opened until plover chicks are located outside of the travel corridor
- Conduct outreach programs to minimization take of piping plovers.

- Predator management will be implemented off-site and on-site to increase the productivity of piping plover nests and offset the take of 4 chicks per year and 12 chicks over the 3-year life time of the permit

VIII. Effect determination and response requested: [*optional]

A. Listed species/critical habitat:

Determination

Response requested

Is not likely to adversely affect

☒ Concurrence

Species:

- Rufa red knot
- Roseate tern
- Northeastern beach tiger beetle

Likely to adversely affect

Species: piping plover

☒ Concurrence

Request Formal Consultation

A. Proposed species/proposed critical habitat:

None

B. Candidate species

None



Martin Miller
Chief, Endangered Species

4-10-15

Date

B. Reviewing ESO Evaluation

- A. Concurrence _____ Nonconcurrency _____
B. Formal consultation required _____
C. Conference required _____
D. Remarks (attach additional pages as needed):



4/10/15

Susi vonOettingen
Endangered Species Biologist
New England Field Office

Date


UNITED STATES GOVERNMENT
MEMORANDUM

U.S. FISH AND WILDLIFE SERVICE

NEW ENGLAND FIELD OFFICE
70 COMMERCIAL STREET, SUITE 300
CONCORD, NEW HAMPSHIRE 03301-5087

Memorandum

To: Assistant Regional Director, Ecological Services
Hadley, Massachusetts

From: Field Supervisor, New England Field Office 

Subject: Biological Opinion: Application for Incidental Take Permit submitted by Town of Orleans, Massachusetts for Over-Sand Vehicle Access

April 10, 2015

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion on a proposed section 10(a)(1)(B) incidental take permit to the Town of Orleans, Massachusetts (hereafter referred to as the Town). The permit will authorize implementation of the Town's Over-Sand Vehicle Habitat Conservation Plan (hereafter referred to as the HCP), dated February 2015. The Town submitted the HCP as a component of their application for a permit for incidental take of federally threatened piping plovers (*Charadrius melodus*) that may occur during escorting over-sand vehicles (OSVs) past up to two broods of unfledged piping plover chicks on or after July 15 in 2015–2017. This biological opinion is prepared in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531, *et seq.*).

Section 7(b)(3)(A) of the ESA requires that the Secretary of the Interior issue biological opinions on Federal agency actions that may affect listed species or critical habitat. Biological opinions determine if the action proposed by the action agency is likely to jeopardize the continued existence of listed species or destroy or adversely modify critical habitat. Section 7(b)(3)(A) of the ESA also requires the Secretary to suggest reasonable and prudent alternatives to any action that is found likely to jeopardize the continued existence of listed species or result in an adverse modification of critical habitat, if any has been designated. This biological opinion assesses only impacts to federally listed species and does not address the overall environmental acceptability of the proposed action.

This biological opinion is based on information from many sources, including the applicant's HCP and information obtained from the scientific literature. Although coordination with the Town regarding the HCP was initiated in November 2013, intra-Service section 7 consultation regarding the HCP commenced in March 2015. A complete administrative record of this consultation is on file in the Service's New England Field Office.

DESCRIPTION OF THE PROPOSED ACTION

As defined in the ESA section 7 regulations (50 CFR 402.02), “action” means “all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas.” The direct and indirect effects of the action must be considered in conjunction with the effects of other past and present Federal, State, or private activities, as well as the cumulative effects of reasonably certain future State or private activities within the action area.

In this case, the proposed action is the Service’s issuance of a 3-year incidental take permit (hereafter referred to as the permit) to the Town. The permit will authorize take of piping plovers and issuance is predicated upon the Service’s approval of the Town’s HCP. The proposed action is fully described in the HCP, which is incorporated by reference into this biological opinion. The following provides a summary of key aspects of the action, including covered lands, covered activities, avoidance and minimization measures, mitigation, monitoring, reporting, and changed circumstances.

Covered lands and activities: The plan area is known as Nauset Beach, including Nauset Beach South and Nauset Spit, where the Town has a history of managing pedestrian and vehicular use in compliance with Service’s *Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act* (USFWS 1994) and the Massachusetts Division of Fisheries and Wildlife’s (MADFW’s) *Guidelines for Managing Recreational Use of Beaches to Protect Piping Plovers, Terns, and Their Habitats in Massachusetts* (MADFW 1993) (hereafter, State and Federal Guidelines) and the 1991 and 2014 Town of Orleans Conservation Commission Orders of Conditions (OOC), as required under the Massachusetts Wetlands Protection Act. The proposed action deviates from the State and Federal Guidelines by implementing a self-escorting program for up to 180 vehicles that may pass by no more than two broods of piping plover chicks beginning on or after July 15, 2015–2017. These activities will take place within an approximately 0.8-mile travel corridor of the OSV trail on Nauset Beach South that is known as the Pochet Overwash. Otherwise, OSV management will remain in compliance with the State and Federal Guidelines and the 1991 and 2014 Orleans Conservation Commission OOCs.

Avoidance and minimization measures: “Self-escorting” under the HCP means that each vehicle will be preceded by a walker at least 10 feet (for safety) in front of that vehicle and at least 15 feet behind the preceding vehicle. Thus, vehicle speeds will be limited to the speed of the walking escort. The self-escorting program will be limited to 2 hours in the morning for vehicles accessing Nauset Beach South and 2 hours in the afternoon for vehicle egress (a total of 4 daylight hours per day). Qualified piping plover monitors will be assigned to the broods to locate and observe chicks prior to, during, and after each self-escort period. Additional monitors will observe the self-escorted vehicles to ensure that the escorting protocols are being correctly implemented. Monitors will halt traffic if chicks are observed less than 100 feet from the sand trail during the escort period. Tire ruts will be raked smooth daily at the end of the second OSV travel period to promote easy passage by plover broods to foraging or sheltering habitat. If mechanical raking is used to remove ruts, a qualified monitor will walk in front of the rake.

Because the OSV travel corridor at Pochet Overwash is situated landward of the wrackline, no measures are needed to reduce impacts to wrackline foraging habitat. Vehicular and pedestrian management elsewhere in the covered lands (Nauset Beach) will continue to follow Federal and State Guidelines for managing piping plovers on recreational beaches.

Mitigation measures: Mitigation includes both onsite and offsite activities. Onsite activities will focus on reducing predation on eggs and chicks at Nauset Beach using non-lethal predator management techniques that will be developed in coordination with the MADFW and the Service. The HCP mitigation plan incorporates a strategy to ramp up onsite efforts to address predation effects at Nauset Beach over the permit period, including outreach and education regarding the effects of predation on piping plover breeding success.

Due to uncertainty about how much success can be achieved during the ramping up period, the Town has also committed to an offsite predator management plan that will be implemented at the same time as the onsite plans. Implementation of the HCP's offsite mitigation commitment is facilitated via an escrow agreement between the Town and the MADFW that describes the manner in which the funds will be transferred and obligated to carry out the offsite mitigation (Appendix 27 of the HCP).

A February 24, 2015 Memorandum from the MADFW to the Service outlines the offsite mitigation strategy and implementation. In 2015 and 2016, the Town will deposit \$10,000 in an escrow account prior to July 15 (the earliest date when the covered OSV use may begin). Selective predator management will be implemented before and during the next breeding season (2016 and 2017) at locations that will increase productivity of at least eight breeding pairs per year. Selective predator management typically involves using traps, firearms, and/or toxicants to reduce predation pressure from species such as crows, fox, and coyotes that are known to cause reduced plover nesting productivity in Massachusetts. In 2017, the requirement for funding offsite mitigation will be waived if 1) the average productivity on Nauset Beach in 2015 and 2016 is greater than 1.5 fledged chicks per pair; or 2) the average productivity in 2015 and 2016 is greater than 1.0 chicks per pair and the Service and the MADFW determine that the onsite non-lethal targeted predator management to be implemented by the Town in 2017 is reasonably likely to be effective in sufficiently raising the productivity level to offset take associated with the HCP's covered activities.

Offsite predator management will not directly affect piping plover productivity at Nauset Beach, but will be applied at other beaches in Massachusetts, thus benefitting the statewide population. Offsite mitigation sites will be selected based on having: (1) a sufficient number of piping plover pairs utilizing the site for nesting (generally eight or more pairs total); (2) low plover productivity rates (generally less than 1.0 fledglings per pair); (3) known presence of typical plover nest predator species (e.g., crows, fox, coyotes, etc.); and (4) baseline information on pre-predator control productivity levels. The MADFW will: (1) identify landowners willing to carry out targeted predator control; (2) procure the services of qualified predator control contractors to carry out the predator control; (3) ensure collection and compilation of nest productivity data pre- and post-project; and (4) ensure that predator management activities will not adversely affect piping plovers and their young should there be seasonal overlap between predator management and breeding piping plovers.

Monitoring and reporting: The Town will continue to monitor piping plovers according to the State and Federal Guidelines and as required by the MADFW. The Town's Natural Resource Manager submits these annual reports documenting the number of piping plovers nesting at Nauset Beach and their productivity to the MADFW, copies of which may be provided to the Service upon request. Documentation of the number of nests, hatching success, and fledging success, and possible reasons for egg and/or chick loss are included in the annual monitoring reports.

Prior to commencing OSV escorting, brood monitors will collect data on chick numbers, chick locations, and travel corridor locations at Pochet Overwash. A map showing chick locations and the designated corridor will be posted at the Nauset Beach administration building and updated daily. Violations, incidents, or accidents associated with the vehicle escort program, including observed take of a chick, will be immediately reported to MADFW and Service staff. Daily reports (including maps) will be made available to the Service and the MADFW upon their request, and summary reports will be submitted at least weekly to the Service and the MADFW.

By December 31, 2015–2017, the Town will submit an annual HCP implementation report to the Service and the MADFW that will include, at a minimum, the estimated age of chicks in each brood when self-escorting was initiated, the fledging success, the escorting dates, the number of broods, the number of chicks present during self-escorting on each date, the number of vehicle passages, and the number of any documented “take” of chicks resulting from the vehicle escorting program. The report will also contain recommendations for improving the efficiency and/or effectiveness of the escorting program in the future.

The Town will also provide a summary of the onsite and offsite mitigation programs in the annual HCP implementation report. For the onsite mitigation, the Town report will include the following information: 1) identification of target predators; 2) non-lethal management implemented (location, dates, days implemented); 3) evaluation of success (number of nest[s] hatched, number of chicks fledged in an area where non-lethal predator management was implemented); and 4) recommendations for improving methodology, addressing different predators, or new methodology. For the offsite mitigation, the Town will incorporate the annual report provided by the MADFW regarding implementation of selective predator management, in accordance with the February 24, 2015 Memorandum.

Changed circumstances: If a currently unlisted species is federally listed as endangered or threatened pursuant to the ESA after the permit has been issued, the Town will request that the Service make a determination if there is a potential for incidental take of the newly listed species to occur while conducting activities covered by the HCP. If so, the Town may choose to modify their management actions in coordination with the Service to ensure incidental take of the species will be avoided, and/or amend the HCP to incorporate the newly listed species and request a formal amendment of the permit in compliance with the provisions of section 10 of the ESA.

Morphological changes to the beach could preclude the implementation of the HCP should the designated travel corridor be impacted to the point vehicles may not proceed through the Pochet area (e.g., a breach at the Pochet Overwash). Irrespective of whether the covered activities described in the HCP are implemented within the Pochet Overwash, all other portions of Nauset Beach will continue to be managed according to the State and Federal Guidelines. If the permitted activity is not able to be implemented due to extreme changes in beach morphology,

the Town will demonstrate that the mitigation has compensated for the estimated take of plovers during previous years or continue to provide mitigation until the take has been offset.

ACTION AREA

For purposes of consultation under section 7 of the ESA, the “action area” is defined by 50 CFR 402.02 as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” Although the covered activities will be limited to the Pochet Overwash on Nauset Beach South, monitoring and reporting under the HCP will encompass all of Nauset Beach. Furthermore, offsite mitigation may be implemented at any piping plover site within Massachusetts that meets selection criteria described in the MADFW’s February 24, 2015 Memorandum. Hence, the action area for this biological opinion is all piping plover beaches within the State of Massachusetts.

SPECIES NOT LIKELY TO BE ADVERSELY AFFECTED BY THE PROPOSED ACTION

In addition to piping plovers, three other federally listed species occur on beaches in Massachusetts. These species are the federally threatened rufa red knot (*Calidris canutus rufa*), endangered roseate tern (*Sterna dougallii dougallii*), and threatened northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*). Critical habitat has not been designated for any of these species.

Rufa red knots breed in the Arctic, but may be present on Nauset Beach during their northward and southward migrations. Rufa red knots, however, are not included as a covered species in the HCP because they have not been observed in the OSV travel corridor at the Pochet Overwash. Moreover, the level of anthropogenic disturbance that could lead to take, such as vehicles passing by staging or roosting red knots, has not been determined. Should it later be determined that OSVs passing by staging or roosting red knots could cause disturbance that rises to the level of take, a separate HCP would be required to address the overall management of Nauset Beach, not merely the proposed covered activity. In the unlikely event that migrating rufa red knots become present during implementation of the covered activities, the effect of those activities is likely to be insignificant. On the basis of the best available information, we conclude that the covered activities are not likely to adversely affect the rufa red knot.

The proposed offsite mitigation may occur on piping plover breeding sites used by post-breeding roseate terns and migrating rufa red knots, but selective predator management activities to benefit piping plovers are conducted before and during the plover breeding season, such that they are unlikely to occur when roseate terns and their young of the year or southward migrating rufa red knots are present. Practices that are routinely employed by qualified predator management specialists to avoid causing disturbance or other adverse effects to breeding piping plovers will also serve to avoid disturbances to any northward migrating rufa red knots or transient pre-breeding roseate terns that might be present.

The Northeastern beach tiger beetle does not occur on Nauset Beach, and the northern boundary of its known historic range is Chatham, Massachusetts. Tiger beetle larvae are found in burrows up to 18 inches deep, and adult tiger beetles are generally found at the water’s edge or on the beach berm. Light foot traffic, such as would occur during selective predator management, does

not adversely affect the species, and predator management activities are otherwise not anticipated to adversely affect Northeastern beach tiger beetles.

In summary, we find that the proposed action is not likely to adversely affect the rufa red knot, the roseate tern, or the Northeastern beach tiger beetle. These species are not considered further in this biological opinion.

BIOLOGICAL OPINION FOR THE PIPING PLOVER

When evaluating the impacts of a proposed action on federally listed species, we consider the rangewide status of the species, the status of the species within the action area (environmental baseline), and the effects of the action on individuals, populations, and the species as a whole.

The threatened piping plover (*Charadrius melodus*; Atlantic Coast population) was added to the list of species protected under the ESA on January 10, 1986. No critical habitat has been designated or proposed for the breeding range of the Atlantic Coast piping plover population.

Life History, Distribution and Status, and Rangewide Threats

Information on piping plover life history, population dynamics, population status, and continuing threats is provided in the 1996 Atlantic Coast Recovery Plan for the Piping Plover (USFWS 1996). Continuing threats to Atlantic Coast piping plovers in the breeding portion of their range identified in the 1996 revised recovery plan include habitat loss and degradation, disturbance by humans and pets, increased predation, and oil spills (USFWS 1996). The 2009 5-Year Review updated information regarding these threats, as well as potential threats of climate change and wind turbine generators (USFWS 2009).¹ We considered the information contained in these documents in the evaluation of this project, and they are incorporated by reference into this biological opinion. Information provided below describes the current status of the species. We also summarize information about threats most pertinent to the nature and duration of effects of the proposed action (i.e., disturbance due to beach recreation and predation).²

Recovery criteria and strategy: The objective of the 1996 revised Atlantic Coast Recovery Plan is to assure the long-term viability of the Atlantic Coast piping plover population in the wild, thereby allowing removal of this population from the Federal List of Endangered and Threatened Wildlife and Plants (50 CFR 17.11 and 17.12). The Atlantic Coast piping plover population may be considered for delisting when the following recovery criteria, established in the plan, have been met:

1. Increase and maintain for 5 years a total of 2,000 breeding pairs, distributed among four recovery units.

¹ Threats in the migration and wintering range, where piping plovers spend more than two-thirds of their annual cycle, were recognized in the revised recovery plan and were substantially elaborated in the 5-Year Review and the 2012 Comprehensive Conservation Strategy for the Piping Plover in its Coastal Migration and Wintering Range in the Continental United States (USFWS 2012).

² The 2009 5-Year Review for the Piping Plover (USFWS 2009) found that, "Although effects from past habitat loss and modification have diminished the piping plover's habitat base in New England, many high quality habitats remain, and piping plovers breed productively on a wide range of microhabitats (Jones 1997). Continued efforts to conserve high quality habitats are warranted, but overall threats to habitat from existing or proposed projects are low in the New England recovery unit."

Recovery Unit	Minimum Subpopulation
Atlantic (Eastern) Canada ³	400 pairs
New England	625 pairs
New York-New Jersey	575 pairs
Southern (DE-MD-VA-NC)	400 pairs

2. Verify the adequacy of a 2,000-pair population of piping plovers to maintain heterozygosity and allelic diversity over the long term.
3. Achieve a 5-year average productivity of 1.5 fledged chicks per pair in each of the four recovery units described in criterion 1, based on data from sites that collectively support at least 90 percent of the recovery unit's population.
4. Institute long-term agreements to assure protection and management sufficient to maintain the population targets and average productivity in each recovery unit.
5. Ensure long-term maintenance of wintering habitat, sufficient in quantity, quality, and distribution to maintain survival rates for a 2,000-pair population.

Attainment of subpopulation targets for each recovery unit provides resiliency and redundancy, thereby increasing the likelihood of survival and recovery of the Atlantic Coast population as a whole. As described below (see section on breeding site fidelity and dispersal), movements of piping plovers between recovery units are extremely rare. Hecht and Melvin (2009a) found significant positive relationships between productivity and population growth in the subsequent year for each of the three U.S. recovery units (but not for Eastern Canada). Hence, it is believed that abundance of piping plovers in each recovery unit population is almost entirely dependent on within-unit productivity. Dispersal of the population across its breeding range serves to protect against stochastic events such as large storms during the breeding season, oil spills, or disease that might depress regional survival and/or productivity. Maintaining robust, well-distributed subpopulations should reduce variance in survival and productivity of the Atlantic Coast population as a whole and provide connectivity that facilitates within-recovery unit recolonization of any sites that experience declines or local extirpations due to low productivity and/or temporary habitat succession at individual sites (Gilpin 1987; Goodman 1987; Thomas 1994). The recovery units are large enough that their overall carrying capacity should be buffered from stochastic variability in the frequency of storms that naturally maintain habitat at individual nesting sites (i.e., the units represent a fairly coarse distribution requirement), while still assuring a geographically well-distributed population if habitat is not lost or artificially degraded.

Recent genetic analysis found strong genetic structure, supported by significant correlations between genetic and geographic distances in both mitochondrial and microsatellite data sets for Atlantic Coast piping plovers (Miller *et al.* 2010). Atlantic birds showed evidence of isolation-by-distance patterns, indicating that dispersal, when it occurs, is generally associated with movement to relatively proximal breeding territories. Thus, maintaining geographically well-distributed populations also serves to conserve representation of genetic diversity and adaptations to variable environmental selective pressures. Substantial regional declines in

³ Recent Canadian Wildlife Service documents and published literature refer to piping plovers breeding in Nova Scotia, New Brunswick, Prince Edward Island, Quebec, and Newfoundland as the piping plover *melodus* subspecies or the "eastern Canada population." This subpopulation coincides exactly with the geographic area termed "Atlantic Canada Recovery Unit" in the Service's 1996 Recovery Plan. To reduce confusion, we refer henceforth in this status review to the Eastern Canada recovery unit.

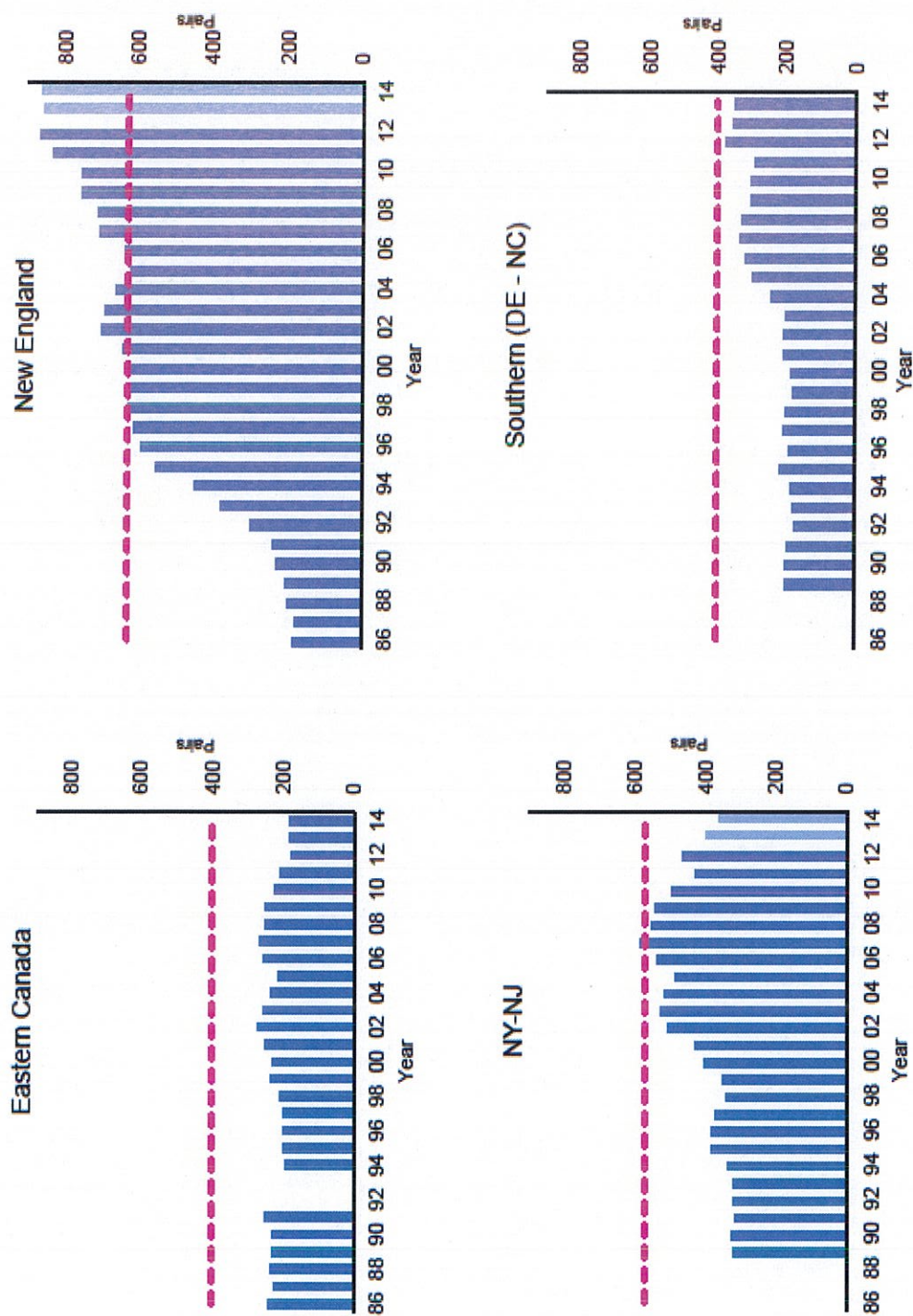
abundance of piping plovers risk loss of genetic diversity that may be important to its long-term survival.

Attainment and maintenance of the minimum population levels for the four recovery units provide resiliency, redundancy, and representation (Schaffer and Stein 2000) that are fundamental to the overall security of the Atlantic Coast piping plover population. In the event that one recovery unit experiences temporary declines in piping plover productivity or survival that lead to a decline in numbers, the other units can provide near-term security for the species as a whole. In the event that a recovery unit population becomes sparse or is extirpated, the potential for repatriation via dispersal from adjacent recovery unit(s) is possible, but this is likely to be a slow process and any loss of genetic variation and adaptation to the regional environment may be difficult to reverse. Thus, the achievement and maintenance of the assigned population level and the associated habitat conditions necessary to support that population for each of the four recovery units are necessary for both the survival and recovery of the Atlantic Coast breeding population of the piping plover.

In accordance with the Endangered Species Consultation Handbook (USFWS and NMFS 1998), and since recovery units have been established in an approved recovery plan, this opinion considers the effects of the proposed project on piping plovers in the New England recovery unit, as well as the Atlantic Coast population as a whole. When an action impairs or precludes the capacity of a recovery unit from providing both the survival and recovery function assigned to it, that action may represent jeopardy to the species. This biological opinion evaluates how the proposed action affects the likelihood of survival and recovery of the New England recovery unit, as well as the relationship of the recovery unit to the survival and recovery of the listed species as a whole.

Population trends since listing under the Endangered Species Act: Abundance of Atlantic Coast piping plovers is reported as numbers of breeding pairs, i.e., adult pairs that exhibited sustained (≥ 2 weeks) territorial or courtship behavior at a site, or were observed with nests or unfledged chicks (USFWS 1996). Annual estimates of breeding pairs of Atlantic Coast piping plovers are based on multiple surveys of almost all breeding habitat, including many currently unoccupied sites. Sites that cannot be monitored repeatedly in May and June (primarily sites with few pairs or inconsistent occupancy) are surveyed at least once during a standard nine-day count period (Hecht and Melvin 2009a). Figure 1 illustrates breeding pair counts for the Atlantic Coast piping plover population since listing in 1986 through 2014. We note that the 2013 and 2014 estimates for the New England and the New York-New Jersey recovery units have not been finalized.

Figure 1. Estimated abundance of breeding piping plovers by recovery unit, 1986-2014. Lighter colored bars denote preliminary estimates. Dashed lines denote subpopulation abundance goal.



The preliminary 2014 Atlantic Coast piping plover population estimate was 1,761 pairs,⁴ more than double the 1986 estimate of 790 pairs. Discounting apparent increases in New York, New Jersey, and North Carolina between 1986 and 1989, which likely were due in part to increased census effort (USFWS 1996), the population increased 98 percent between 1989 and 2012, and then declined 7 percent between 2012 and 2014 for a net 1989-2014 increase of 84 percent.⁴

Overall population growth is tempered by geographic and temporal variability. By far, the largest net population increase between 1989 and 2014 occurred in New England (318 percent)⁴ where the 2014 population estimate of 862 pairs⁴ is nearly identical to the peak abundance estimate of 865 pairs posted in 2012. Net growth in the Southern recovery unit population was 78 percent between 1989 and 2014. Most of the Southern recovery unit breeding population increase occurred in 2003 to 2005 and 2011 to 2012. Abundance in the New York-New Jersey recovery unit experienced a net increase of 13 percent⁴ between 1989 and 2014, but the population declined sharply from a peak of 586 pairs in 2007 to 361 pairs⁴ in 2014 (-38 percent⁴). In Eastern Canada, where increases have often been quickly eroded in subsequent years, the population posted a 21 percent net decline between 1989 and 2014; between 2007 and 2014, it decreased 31 percent.

In addition to the ongoing declines in the New York-New Jersey and Eastern Canada recovery units, other periodic regional declines illustrate the continuing risk of rapid reversals in abundance trends. Examples include decreases of 21 percent in the Eastern Canada population in just 3 years (2002 to 2005) and 68 percent in the southern half of the Southern recovery unit during the 7 years from 1995 to 2001. The 64 percent decline in the Maine population between 2002 and 2008, from 66 pairs to 24 pairs, followed only a few years of decreased productivity. Although intensified protection efforts between 2008 and 2013 contributed to high productivity in Maine (range = 1.52-2.12 chicks per pair), the breeding population has only rebounded to 50 pairs as of 2014.

Breeding site fidelity and dispersal: On the Atlantic Coast, almost all observations of inter-year movements of birds have been within the same or adjacent states. Extensive efforts to resight >1,400 Atlantic Coast Piping Plovers color-banded in Virginia, Maryland, Massachusetts and five Eastern Canadian provinces between 1985 and 2003 resulted in only four records of plovers breeding outside the recovery unit in which they were banded (USFWS files; Amirault *et al.* 2005, updated by D. Amirault-Langlais and F. Shaffer, Canadian Wildlife Service, pers. comm. 2009).

In New York, Wilcox (1959) recaptured 39 percent of the 744 adult plovers that he banded in prior years (many were recaptured during several successive seasons and all but three of them were retrapped in the same nesting area), but recaptured only 4.7 percent of 979 plovers that he banded as chicks. He also observed that males exhibited greater fidelity to previous nest sites than females. Strauss (1990) observed individuals that returned to nest in his Massachusetts study area for up to six successive years. Also in Massachusetts, 13 of 16 birds banded on one

⁴ Denotes preliminary estimate.

site were resighted the following season, with 11 nesting on the same beach (MacIvor *et al.* 1987). Of 92 adults banded on Assateague Island, Maryland, and resighted the following year, 91 were seen on the same site, as were 8 of 12 first-year birds (Loefering 1992). Cross (1996) reports that 10 of 12 juveniles banded on Assateague Island, Virginia and resighted one and/or two years later were on the Virginia or Maryland portions of Assateague Island, while the other two were observed on other Virginia barrier islands. Site fidelity of banded adults on Long Island in 2002-2004 was 83 percent (Cohen *et al.* 2006).

Forty percent of 329 eastern Canada piping plovers banded as adults in 1998-2003 exhibited fidelity to their nesting beaches in every year that they were resighted, and only 6 of 152 recaptured adults (4 percent) moved to a different province in a subsequent year (Amirault *et al.* 2005, updated by D. Amirault-Langlais and F. Shaffer, CWS, pers. comm. 2009). By contrast, 5 percent of 95 plovers banded in their hatch year nested at their natal beaches and 84 percent nested in their natal province. Only 1 of 888 banded birds, however, was detected breeding outside of eastern Canada. That bird, banded as a chick on Prince Edward Island, fledged a chick in Massachusetts after unsuccessfully breeding on Long Island, New York, the previous season.

Threats from beach recreation: Threats from human beach users were cited in the final listing rule and described in detail in the 1996 revised Atlantic Coast recovery plan. Threats to breeding piping plovers from both motorized and non-motorized beach recreation activities are relatively well understood, and recommended management options are described in the Federal Guidelines (USFWS 1994).⁵ Newer threats include the increasing popularity of “extreme sports,” such as kite-buggies and surf kites (also called “kite boards”), which accidentally land in and near breeding habitat.

Management activities to protect habitat, nests, and unfledged chicks from impacts of pedestrian recreation include symbolic fencing of courtship and nesting habitat, leashing or prohibition of pets during the breeding season, buffers between breeding piping plovers and fireworks displays, informational and interpretive signing, public education, and law enforcement patrols. On sites where off-road vehicles are allowed to operate during the breeding season, protection requires additional closures of the lower beach and intertidal zone during periods when unfledged chicks are present. These management activities are predicated on frequent monitoring of individual breeding pairs during territory establishment and courtship, nesting, and chick-rearing periods. For example, periodic adjustment of buffers established with warning signs and symbolic fencing to protect piping plover courtship habitat, nests, and incubation behavior requires regular observations of breeding activity. Minimizing the spatial extent and duration of restrictions on use of off-road vehicles is contingent on precise hatching date predictions and daily verification of brood locations (USFWS 1996). Effectiveness of these management measures to avoid or reduce threats is contingent on skilled monitoring and timely implementation and enforcement of adequate buffers to protect piping plover courtship, nesting, and brood-rearing. All of these

⁵ A March 2015 addendum to the Federal Guidelines provides information about occasional occurrences of early hatching and delayed fledging of piping plover chicks that may affect the timing of protections needed to avoid take associated with management of motor vehicles (USFWS 2015).

labor-intensive actions require continued implementation to counter threats that are present every year.

Threats from predation: The final listing rule identified predation by pets, feral dogs and cats, skunks, and raccoons as threats on the plover's Atlantic Coast range. The 1996 revised recovery plan provides a more thorough discussion of predation threats, and recommends specific tasks to be implemented in an integrated approach to predator management employing a full range of management techniques.

Research and reports indicate that predation poses a continuing (and perhaps intensifying threat) to Atlantic Coast piping plovers. Erwin *et al.* (2001) found a marked increase in the range of raccoons and foxes on the Virginia barrier islands between the mid-1970s and 1998, and concurrent declines in colonies of beach-nesting terns and black skimmers. Boettcher *et al.* (2007) identified predation as “the primary threat facing plovers in Virginia.” Review of egg losses from natural and artificial nests at Breezy Point, New York found that gulls, crows, and rats were major predators (Lauro and Tanacredi 2002). Recommendations included removal of crow nests to complement ongoing removal of gull eggs and nests. Modelling by Seymour *et al.* (2004) using red fox movement data from northern England indicated that risk of fox predation on ground-nesting bird species in long, linear habitats increased with narrowing habitat width, and was sensitive to changes in habitat width of even a few meters. Free-roaming domestic and feral cats, particularly those associated with human-subsidized feral cat colonies, appear to be an increasing threat to piping plovers and other beach nesting birds (USFWS 2009).

Although predator numbers are undiminished or increasing, effectiveness of predator exclosures (wire cages placed around nests, a key management tool in the early years of the recovery program) has declined. Cohen *et al.* (2009) found that exclosures improved nest survival, but not overall reproductive output on Westhampton Island, New York study sites, a result that has been echoed by studies of other plover species (e.g., Neuman *et al.* 2004). Episodes of systematic harassment of incubating piping plovers (primarily by foxes [*Vulpes vulpes*], coyotes [*Canis latrans*], and American crows [*Corvus brachyrhynchos*]) and depredation at exclosures, elevated rates of nest abandonment, and incidents of adult mortalities associated with exclosed piping plover nests on the Atlantic Coast (Mostello and Melvin 2002; Melvin and Mostello 2003) and on the Northern Great Plains (Murphy *et al.* 2003) prompted managers to use exclosures more selectively. A Structured Decision Making Workshop in December 2013 developed and tested a prototype decision support model with the potential to increase the efficacy of exclosures and identify site-specific environmental factors that affect the demographic benefits and risks of exclosures (Hecht *et al.* 2014).

As effectiveness of exclosures has declined, managers have increased selective predator removal activities at many sites throughout the U.S. Atlantic Coast range (e.g., USDA 2006; NPS 2007; Cohen *et al.* 2009). Most predator removal efforts have focused on mammalian predators, but gulls and crows have been targeted at some sites (e.g., Brady and Inglefinger 2008; USFWS 2007; USDA 2008; Davis 2015). Information about the effectiveness of predator removal activities is provided in the section on the effects of the proposed mitigation (below).

Predation is a widespread and continuing threat to breeding Atlantic Coast piping plovers. Implementation of conservation measures for addressing predation threats is time-consuming and costly. Although site-specific predator pressures vary from year to year, predator management is a recurring need.

Environmental Baseline

Regulations implementing the ESA (50 CFR 402.02) define the “environmental baseline” as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects (in the action area) that have undergone section 7 consultation and the impacts of State and private actions that are contemporaneous with the consultation in progress. The action area for the proposed action is all piping plover beaches within the State of Massachusetts.

Status of the piping plover within the action area: Annual surveys of Nauset Beach South and Nauset Spit for piping plover pairs and productivity have been conducted since 1991. The population of breeding piping plovers at Nauset Beach has ranged from a minimum of 12 pairs (1991) to a high of 32 pairs (2010 and 2011). Nauset Beach South, on average, has fewer pairs of breeding plovers than Nauset Spit, with the exception of 2013 when Nauset Beach South had 16 pairs of plovers, while Nauset Spit had 13 pairs of plovers. Although habitat is highly suitable and recreational management has been consistent with State and Federal Guidelines, inter-annual productivity at both of these beach sections varies widely and is dependent on weather (storms causing loss of nests and chicks) and predation impacts.

Abundance of breeding piping plovers in Massachusetts has increased more than 500 percent since 1987, and has exceeded the goal for the entire New England recovery unit (625 pairs in Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut) since 2011. The preliminary 2014 estimated abundance of breeding piping plovers in Massachusetts is 664 pairs.

Factors affecting the environment in the action area: Piping plovers nest on the sandy, sparsely vegetated dunes and overwash areas of Nauset Beach, including Nauset Beach South and Nauset Spit. Adult plovers and their young forage on wrack washed up onto the Beach and intertidal flats adjacent to the bay and oceanside shoreline. The Town of Orleans has been managing breeding piping plovers under an Orleans Conservation Commission OOC since 1991, having adopted one of the earliest beach management plans for plovers in the State of Massachusetts.

Statewide, piping plovers nest on private- and government (municipal, State and Federal)-owned beaches. Many of these beaches are heavily used for recreation during the summer months when plovers are present and breeding. State guidelines (MADFW 1993) for managing piping plovers have been in place since 1993, although intensive management of beaches was initiated prior to their publication. In 1994, the Service developed guidelines (USFWS 1994) for managing recreational activities on piping plover habitat and avoiding violations of the ESA. Management at most Massachusetts sites conforms to both State and Federal Guidelines.

All current nesting beaches and most historical or potential sites in Massachusetts are surveyed each year. In 2008, 84 percent of breeding pairs of piping plovers in Massachusetts were surveyed >30 times between May 1 and July 31 (USFWS unpublished data). Since 1995, estimates of productivity were obtained for more than 95 percent of all breeding pairs in the State. Hecht and Melvin (2009b) estimated that an average of 83 hours of paid staff time were expended per pair for onsite monitoring and management of piping plovers, data compilation, report preparation, and planning in Massachusetts in 2002.

On most Massachusetts beaches where nests are potentially threatened by pedestrian activities, nests are protected with buffers delineated by symbolic fencing and warning signs. Although State and Federal Guidelines recommend that pets be leashed and under control of their owners at all times from April 1 through August 31 on beaches where piping plovers are present or have traditionally nested, enforcement of leash requirements is a continuing management problem on many Massachusetts piping plover sites. Management of off-road vehicles at major beaches in Massachusetts conforms to most components of State and Federal Guidelines. Beginning in early April, and extending until the first egg hatches, off-road vehicles are restricted to discrete travel corridors along the outer edges of suitable plover nesting habitat. The Guidelines call for sections of beach where unfledged plover chicks are present to be completely closed to recreational vehicles until chicks are observed in sustained flight. Under the Massachusetts Wetlands Protection Act, the OOCs require the avoidance of short- and long-term adverse effects on the habitat of listed species. This provides an effective regulatory tool to protect plover habitat from degradation caused by off-road vehicles and dune building activities.

Additional management challenges include increasing predation pressure, particularly from coyote, fox, cats, and avian predators, including crows and gulls. Some nests are protected with wire predator exclosures (see earlier discussion of benefits and risks associated with exclosures), and targeted predator removal has been implemented at several sites.

Prior Federal projects in the action area that have undergone section 7 consultation: Six nonjeopardy formal consultations were completed for projects within Massachusetts between 1997 and 2008. Most of the consultations were with the U.S. Coast Guard for marine event permits for fireworks events in coastal areas of Connecticut and Massachusetts. These activities occur once a year and require follow-up reporting to assess take. A nonjeopardy biological opinion was issued for the Cape Wind Energy Project in 2008, but the project has not yet been constructed. In 2010, the Service completed a nonjeopardy opinion on flexible management, entailing potential exclusion of up to 400 meters of suitable nesting habitat from symbolic fencing on narrow pedestrian lifeguarded beaches at the Cape Cod National Seashore. The biological opinion was amended in 2012 and 2015 to extend the time frame for implementation of flexible management options. Flexible management for a reduction in symbolic fencing of one nest was implemented in 2010, but the nest was subsequently lost to flooding. Flexible management was not necessary and hence not implemented in 2011 through 2014. Therefore, to date no take has accrued for this biological opinion.

Effects of the Proposed Action

Effects of the covered activities: With the exception of the proposed covered activities, the Town will be following the State and Federal Guidelines for managing beach recreation to avoid take. Therefore, the only anticipated impacts of the proposed action will occur during implementation of the late season self-escort OSV program in accordance with the protocols described in the HCP.

Late season OSV use (beginning on or after July 15) is likely to result in adverse effects leading to take of unfledged piping plover chicks that may be in the vicinity of the self-escorted vehicles. Adverse effects may include direct mortality due to crushing of unfledged chicks, disturbance, and very transient presence of tire ruts during and between the two daily escort periods. The covered activities allow for self-escorted OSV travel past up to two broods of four chicks each (generally the maximum number of chicks per brood).

Adult mortality is not anticipated. Under the State and Federal Guidelines, the likelihood of take by vehicles in designated travel corridors in the vicinity of adult piping plovers foraging or roosting outside of symbolically fenced nesting habitat (when unfledged chicks are not present) is considered discountable. Although rare mortalities of adult piping plovers actively brooding unfledged chicks have been documented (Melvin *et al.* 1994; Houghton 2005), this risk is discountable for this HCP because vehicle traffic may only occur during daylight hours and with a required pedestrian escort for each vehicle.

Direct chick mortality is anticipated to occur in the event an unfledged piping plover chick or chicks enter the self-escorted travel corridor during the 4 hours per day of OSV travel and are run over by a vehicle. This could occur if a chick is not detected by the chick monitors or the walker preceding each vehicle. Due to their cryptic coloration, small size, and behaviors, piping plover chicks are difficult to see. Their movements are very unpredictable, and they are capable of moving very fast. Two-day-old chicks are capable of moving 100 feet in less than 15 seconds (Wilcox 1959). Minimization measures to reduce mortality include: monitors locating chicks prior to and during the self-escorting of vehicles; allowing vehicle traffic to occur only when chicks are 100 feet or more from the travel corridor; reduction in vehicle speed from 15 mph (under the OOC) to less than 5 mph; escorts watching for chicks in the corridor; and stopping vehicle traffic if monitors and/or the Natural Resource Manager determine that chicks are in the travel corridor and vulnerable to being run over. These minimization measures will substantially reduce, but not eliminate the risk of vehicle collisions with chicks. In the event that a mechanized rake is used to smooth ruts following the afternoon escort period, the marginal risk of chick mortality is extremely small, but not completely discountable. A qualified monitor with experience detecting piping plover chicks will precede the raking vehicle. Unlike the locations where beach raking typically occurs (just landward of the intertidal zone), the OSV corridor does not contain wrack which attracts foraging chicks and can make them especially difficult to detect.

There is abundant high quality foraging habitat on both the ocean and bayside of the Pochet Overwash, well away from the OSV travel corridor, where plover chicks spend most of their time. Thus, even in the absence of the proposed action, plover chicks would be expected to

spend very little time in the area where the OSV travel corridor will be located. Minimization measures provided in the HCP will further reduce disturbance and barriers to chick movements to the point that we anticipate effects will be insignificant.⁶ The proposed action will be restricted to the 4 hours per day of self-escorting. An additional hour of escorted raking (to smooth the tire ruts) will create minor disturbance because it will only affect a small area at any given time. Initiating the self-escort program after July 15 is likely to ensure that chicks are older, larger and more easily observed by vehicle escorts. In the past 5 years, approximately 63 percent of the broods have been 2 days or older, and 36 percent of the broods have been 11 days or older. Older chicks may be less vulnerable to disturbance, more likely to survive on their own for short periods of time if separated from adults, and better able to find foraging habitat away from the sand trail (which does not provide foraging habitat, although it is a temporary barrier to moving between foraging habitats).

Impacts to habitat will be of short duration, spatially limited to the Pochet Overwash, and similar in type to impacts that occur before and after brood rearing under the State and Federal Guidelines. No reduction in habitat for courtship or nest establishment on Nauset Beach is anticipated because the habitat will be managed according to State and Federal Guidelines until chicks are present. Therefore, there will be no impacts to the abundance and distribution of nesting pairs on Nauset Beach. The OSV travel corridor is located between (not within) the ocean and bayside foraging habitats, therefore OSV travel and raking of ruts should not affect wracklines or the prey base in moist substrate habitats favored by piping plover adults and chicks. During the 4 hours of self-escorted vehicle travel, the functional suitability of the habitat may be temporarily affected, as chicks may not be able to cross the sand trail to reach shelter or forage on the other side⁷. Ruts created by morning vehicle traffic may impede or slow chick travel during the 6 hours between vehicle access time periods (i.e., between 10 a.m. and 4 p.m.); however, the ruts will be raked daily following the afternoon vehicle access period to provide unimpeded access for the remainder of the day, night, and early morning (approximately 12 to 13 hours).

In the absence of minimization measures, it is anticipated that annually a maximum of eight chicks could be killed by being run over by OSVs (four chicks per brood), or 24 chicks over the life of the permit (4 chicks per brood x 2 broods x 3 years = 24 chicks), or experience elevated mortality rates due to disturbance or reductions in functional habitat. However, the minimization measures will substantially decrease these risks. Intensive chick monitoring, escorting of each OSV, limitations on OSV travel to 4 daylight hours per day (2 hours in the morning and 2 hours in the afternoon), daily raking of ruts, and location of the travel corridor outside foraging habitats are key considerations. We concur with the HCP's assessment that these minimization measures

⁶ At other sites with different habitat configurations and without minimization measures provided in this HCP, vehicles passing through areas near chicks could restrict chick movement and prevent them from foraging in preferred feeding habitat, seeking cover from predators or unfavorable environmental conditions, being brooded or otherwise protected by adults, or finding suitable roosting habitat. This could affect the chicks' ability to thrive and delay fledging or expose them to an increased risk of predation.

⁷ If chicks are observed within 100 feet of the corridor, vehicle traffic will be stopped until the chicks move away. Therefore, the opportunity for chicks to move between the ocean and the bay habitats may be afforded in such cases.

will reduce mortality due to collisions by 50 percent. By themselves, disturbance (outside of prime foraging habitat for up to 4 hours per day) and transient effects on habitat are unlikely to cause take, but they may be minor contributing factors to elevated chick mortality due to all effects of self-escorted OSV travel in occupied chick habitat.

Although up to four chicks per year (12 chicks over the 3-year life of the permit) might be killed as a result of the covered activities, the effect on productivity (chicks fledged per breeding pair) will be less. The interval from hatching to fledging is a period of high attrition for piping plovers, and mortality rates are influenced by a variety of factors, including but not limited to weather, predation and intra-specific competition. We believe that the average productivity from 1998 to 2014 (excluding 1999, 2005 and 2009 missing data) for piping plover pairs present on Nauset Beach South after July 15, 1.7 chicks per pair, is the best estimate of productivity that would be expected in the absence of the proposed HCP.⁸ Based on the long-term productivity average, two pairs would, in the absence of the HCP, produce approximately 3.4 chicks per year (2 pairs x 1.7 chicks/pair), for a total of 10.2 chicks fledged over 3 years (the life of the permit). As described above, the minimization measures are anticipated to reduce mortality due to the proposed action by 50 percent. Therefore, the anticipated impact is the loss of 1.7 chicks that otherwise would have fledged each year and 5.1 chicks over the 3-year life of the HCP.

Effects of the proposed mitigation: Effects of the proposed mitigation are expected to be wholly beneficial. Onsite outreach and education may increase compliance with measures to avoid adverse effects of recreational use throughout Nauset Beach. Coordination with the MADFW and the Service prior to implementation of any non-lethal predator management will assure that no adverse effects are likely to occur. Potential for beneficial effects of non-lethal predator management cannot be assessed at this time, but monitoring will be conducted to inform future evaluations. Although the amount of beneficial effect that will accrue from onsite mitigation is unknown, the best available information substantiates that offsite predator management has a high likelihood of offsetting anticipated loss of chicks due to the covered activities at the Pochet Overwash.

There is a very strong record of increased piping plover productivity associated with targeted predator removal in the species' Atlantic Coast range. Boettcher *et al.* 2007 state that predator management is "one of the most important and expensive avian conservation measures being implemented on Virginia's barrier islands." Cohen *et al.* (2009) found that the number of chicks fledged per pair at Westhampton, New York increased with the annual number of cats and foxes trapped. From 2007 to 2014, 137 pairs of piping plovers breeding at sites in Maine with predator removal (mean = 4.25 sites per year, range = 2 – 7) fledged 47 percent more chicks per pair than 149 pairs at sites without predator removal (mean = 9.6 sites per year, range = 4 – 13). Productivity at sites with predator management was higher than at sites without predator management in 7 of the 8 years (A.D. Vashon, Wildlife Services, pers. comm. 2014). Analysis of data from 11 Massachusetts sites (MADFW, unpublished data) with at least one season of selective predator management performed by the U.S. Department of Agriculture Animal and Plant Health Inspective Service (USDA-APHIS) between 2006 and 2014 found that average

⁸ Selection of this geographic area and time period seeks to balance effects of site-specific factors at the time of year when the covered activities will occur, while also reflecting the inter-annual variation in conditions affecting piping plover productivity for a reasonably robust sample of 31 pairs over 14 years.

pipng plover productivity in the years with predator management was 84 percent higher than average productivity in the 2 years prior to implementation of predator management. At 4 of the 11 sites where predator management was implemented for 5 or more years, productivity averaged 67 percent higher in years with selective predator management as compared to the 2 years prior to management.

Although the overall results of predator removal are very strongly positive, we recognize the unevenness in comparisons between years and sites with and without predator management. This variability may indicate that key predators were not removed or may result from confounding factors such as weather, disturbance, or habitat quality that may affect piping plover productivity. For example, after adjusting for changes in annual statewide productivity, the MADFW found that productivity at four sites with 5 or more years of predator management was 57 percent higher than in prior years without predator management (compared with a 67 percent increase without adjustment). There is also uncertainty inherent to a small mitigation program that has been scaled to the effect of the reasonably anticipated take from covered activities (<2 chicks per year).⁹ Selective predator removal would be more certain to produce the predicted number of fledged chicks if it were conducted at more sites in more years, because the potential for localized situations where confounding factors might reduce the benefits would likely be offset at other sites or in other years. However, the productivity increase projected by the MADFW of 0.25 chicks per pair for a minimum of eight pairs at the site(s) where predator management will be implemented is based on only a 20 percent increase in productivity over the long-term statewide average. This is much less than the overall increases in Maine and Massachusetts, as described above. Based on a review of available information from across the Atlantic Coast range (including results from the earliest years of experience at some of the Maine and Massachusetts sites summarized above), USFWS *et al.* (2012) similarly determined that a selective predator management program associated with the Bouchard Barge 120 Oil Spill would be expected to increase piping plover productivity by at least 20 percent. Thus, the likelihood that the offsite mitigation will offset the loss of chicks due to the covered activities is very high and it is possible that more chicks will be produced by mitigation activities than will be lost due to the covered activities.

In the event that stipulations in the HCP waiving funding of offsite mitigation in 2017 (for predator management to be implemented in 2018) are triggered, either (1) the entire Nauset Beach population will have produced more chicks in 2015 and 2016 than are necessary to maintain a stationary population; or (2) evidence from onsite non-lethal predator management will have been found effective to offset the projected loss of chicks from the covered activities. Under the first scenario (productivity greater than 1.5 chicks per pair in 2015 and 2016), Nauset Beach will have contributed to a growing breeding population. Under the second scenario, onsite mitigation will be anticipated to offset projected losses in 2017.

Net effects of the covered activities and the proposed mitigation: The best available information indicates that the offsite mitigation will at least offset the loss of chicks due to the covered activities over the 3-year life of the proposed HCP. We have also considered that

⁹ Small samples and confounding environmental factors will make it very difficult to assess the efficacy of the mitigation for this HCP. This may be surmountable in the context of a larger, multi-year predator management program.

predator removal under this HCP will be implemented in the year following implementation of the covered activities and that this mitigation will be conducted at other beaches in Massachusetts rather than at Nauset Beach.

The 1-year lag in benefits from mitigation compared with the potential losses due to the covered activities means that there will also be a 1-year lag in recruitment of these chicks (resulting from mitigation) into the breeding population. Although this might be demographically significant (increasing the inter-annual variance in productivity) if it involved a large number of chicks or a longer time lag, the effect of shifting productivity of two chicks by 1 year will be small.

Likewise, a shift in the locations where chicks are produced could affect the overall security of the population, particularly if the losses occurred in a recovery unit where the population was low or experiencing sustained declines and the mitigation was implemented in a different recovery unit with a robust population. Under the proposed action, however, both covered activities and the mitigation measures will be implemented within Massachusetts (which is within the New England recovery unit). Furthermore, the MADFW will select mitigation sites with a recent history of low productivity. Hence, there is potential for offsite mitigation to slightly increase evenness of the overall distribution of productivity within Massachusetts. However, at the scale of this proposed action (offsite mitigation for the loss of two chicks per year within Massachusetts), and given that piping plover chicks typically disperse to other sites in the same general region when they recruit into the breeding population, the potential to affect the distribution of the breeding population (either negatively or positively) is discountable.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. We are currently unaware of any future State, Tribal, local, or private actions that are reasonably certain to occur on Nauset Beach or in Massachusetts. Except for the activities proposed in the HCP, vehicular and pedestrian management on Nauset Beach will continue to follow State and Federal Guidelines for managing piping plovers on recreational beaches. The Massachusetts Endangered Species Act and the Massachusetts Wetlands Protection Act provide strong protections for piping plovers and their habitats in Massachusetts. The statewide programmatic HCP for piping plovers in Massachusetts, currently under development, will be subject to a future section 7 consultation.

Conclusion

The jeopardy analysis in this biological opinion assesses whether the proposed action reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of the Atlantic Coast piping plover by reducing their reproduction, numbers, or distribution in the wild. The action area for this consultation is located in the New England recovery unit. This and three other recovery units were defined in the final recovery plan for this species (USFWS 1996). Recovery units, by definition, comprise areas that are essential to the conservation of the listed species. Therefore, we start by considering the effects of the proposed

action on the piping plover population on Nauset Beach and in Massachusetts. We then consider those effects in the context of the current status of piping plovers in the New England recovery unit and the environmental baseline in the action area, taking into account any cumulative effects. Finally, we determine whether implementation of the proposed action is likely to appreciably reduce the likelihood of both the survival and recovery of the species in the wild.

In formulating this biological opinion, we consider the following points discussed earlier in this document:

1. The covered activities will expose up to two broods of unfledged piping plovers to risks from direct mortality. No adult mortality is anticipated. Impacts to habitat are limited to transient presence of tire ruts for approximately 10 hours per day during the time when the covered activities will occur. No impacts to courtship habitat, nesting habitat, or foraging habitat are anticipated. Minimization measures provided in the HCP will reduce disturbance and barriers to chick movements to the point that those effects will be insignificant.
2. Measures to minimize loss of chicks are anticipated to reduce take by 50 percent.
3. The anticipated impact is the loss of 1.7 chicks that otherwise would have fledged each year and 5.1 chicks over the 3-year life of the HCP.
4. The best available information indicates that the offsite mitigation will at least offset the loss of chicks due to the covered activities.
5. There are no anticipated impacts to the abundance and distribution of nesting pairs of piping plovers on Nauset Beach.
6. At the scale of this proposed action (offsite mitigation for the loss of two chicks per year within Massachusetts), and given that piping plover chicks typically disperse to other sites in the same general region when they recruit into the breeding population, the potential effects on distribution of the breeding population (either negatively or positively) will be insignificant.
7. No effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area have been identified.
8. The proposed action will take place in the New England recovery unit, where the piping plover population has been has exceeded (or been within three pairs of) its 625-pair abundance goal since 1998, attaining a post-listing high of 865 pairs in 2012. The preliminary 2014 abundance estimate is 862 pairs, 38 percent above the recovery unit goal.

9. Although progress towards recovery in the other three Atlantic Coast piping plover recovery units has been uneven, and two recovery units (Eastern Canada and New York-New Jersey) have experienced steep declines in breeding abundance in recent years, Atlantic Coast piping plovers almost always breed within the region where they were fledged. Thus, the potential for effects of the proposed action on the abundance of piping plovers outside New England is discountable.

After reviewing the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, we find that the proposed action is not reasonably expected to reduce appreciably the likelihood of both survival and recovery of piping plovers in the New England recovery unit by reducing their reproduction, numbers, or distribution in the wild. Our analysis indicates that the effects of the covered activities are small and are likely to be fully offset by mitigation activities. Furthermore, the duration of the proposed action is limited to 3 years, and no impacts to habitat that will persist for more than a few hours are anticipated. The net effects of the proposed action on the New England recovery unit are expected to be neutral, and the potential for effects (either negative or positive) on the numbers or distribution of piping plovers in the other recovery units is discountable. We conclude that the proposed action is not likely to jeopardize the continued existence of the New England recovery unit or the Atlantic Coast piping plover population as a whole.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations under section 4(d) of the ESA prohibit the taking of endangered and threatened species, respectively, without special exemption. Take is defined in section 3 of the ESA to mean harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by regulation (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by regulation as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA, provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The proposed HCP and its associated documents clearly identify anticipated impacts to piping plovers likely to result from the covered activities and the measures that will be implemented to minimize those impacts. All measures described in the HCP, and any section 10(a)(1)(B) permit issued with respect to the HCP, are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement pursuant to 50 CFR §402.14(i). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the ESA to apply. If the permittee fails to adhere to these terms and conditions, the section 10(a)(1)(B) permit may be suspended or revoked.

Amount and Extent of Take

The primary form of take anticipated by the proposed HCP and our analysis in the biological opinion is direct mortality (i.e., killing) of chicks. Limited disturbance due to the covered activities and presence of tire ruts during and between the morning and afternoon escort periods are not expected to rise to the level of harassment or harm. In the very unlikely event that harassment or harm contributes to chick mortality, these effects will not be discernable from direct mortality. We anticipate that no more than 12 unfledged piping plover chicks will be killed over the 3-year life of the HCP and permit.

Detecting mortality or injury of piping plovers (especially chicks), particularly on beaches where vehicles are being operated, is extremely difficult. Cryptic coloration is the species' primary defense mechanism, evolved to cope with natural predators; nests, adults, and chicks all blend with their typical beach surroundings. Newly hatched chicks stand only 2.5 inches high, weigh less than a quarter ounce, blend with the beach substrate, and often respond to approaching vehicles, pedestrians, and perceived predators by "freezing" in place to take advantage of their natural camouflage. Dead chicks may be covered by wind-blown sand, ground into the sand by other passing vehicles, washed away by high tides, or consumed by scavengers. Thus, take is likely to be undetected.

Effect of the Take

Through the analysis in this biological opinion, we have determined that the effect of this potential take is loss of 5.1 chicks that otherwise would have fledged. This take is likely to be fully offset by mitigation activities that are also part of the proposed action. This level of anticipated take is not likely to result in jeopardy to the New England recovery unit or the Atlantic Coast piping plover population as a whole.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid the adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

Several ongoing Service activities are being implemented to assist in the recovery of piping plovers on Nauset Beach and elsewhere in Massachusetts. These include supporting development of the MADFW's programmatic HCP for piping plovers, modelling to assess the risks and benefits of predator exclosures, and modelling the effects of sea level rise predictions on future availability of Atlantic Coast piping plover habitat.

REINITIATION NOTICE

This concludes the formal intra-Service consultation on the issuance of an incidental take permit to the Town of Orleans. As provided in 50 CFR §402.16, reinitiation of formal consultation is

required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

LITERATURE CITED

- Amirault, D.L., F. Shaffer, K. Baker, A. Boyne, A. Calvert, J. McKnight and P. Thomas. 2005. Preliminary results of a five year banding study in eastern Canada: Support for expanding conservation efforts to non-breeding sites? Canadian Wildlife Service unpublished report.
- Amirault-Langlais, D. L. and F. Shaffer. 2009. Email dated July 31, 2009, from Diane Amirault-Langlais, Canadian Wildlife Service, to Anne Hecht, U.S. Fish and Wildlife Service, Northeast Region. Subject: Piping Plover Dispersal.
- Brady, J. and F. Inglefinger. 2008. Piping plover research and management program at Crane Beach, 2008 report. The Trustees of Reservations, Ipswich, MA.
- Boettcher, R., T. Penn, R.R. Cross, K.T. Terwilliger and R.A. Beck. 2007. An overview of the status and distribution of piping plovers in Virginia. *Waterbirds* 30 (special publication 1):138-151.
- Cohen, J.B., J.D. Fraser and Daniel H. Catlin. 2006. Survival and site fidelity of piping plovers on Long Island, New York. *Journal of Field Ornithology*. 77(4):409-417.
- Cohen, J.B., L.M. Houghton and J.D. Fraser. 2009. Nesting density and reproductive success of piping plovers in response to storm- and human- created habitat changes. *Wildlife Monographs* 173: 1-24.
- Cross, R.R. 1996. Breeding ecology, success, and population management of the piping plover (*Charadrius melodus*) at Chincoteague National Wildlife Refuge, Virginia. M.S. thesis. College of William and Mary, Williamsburg, Virginia.
- Davis, C. 2015. 2014 fish crow predator management, Cape May Point State Park, progress report. Endangered and Nongame Species Program, New Jersey Division of Fish and Wildlife.
- Erwin, R.M., B.R. Truitt and J.E. Jimenez. 2001. Ground-nesting waterbirds and mammalian carnivores in the Virginia barrier island region: running out of options. *Journal of Coastal Research* 17:292-296.
- Gilpin, M.E. 1987. Spatial structure and population vulnerability, pp 125-139 in M.E. Soule (ed) *Viable populations for Conservation*. Cambridge University Press, New York.
- Goodman, D. 1987. How do species persist? Lessons for conservation biology. *Conservation Biology* 1: 59-62.
- Hecht, A. and S.M. Melvin. 2009a. Population trends of Atlantic Coast piping plovers, 1986-2006. *Waterbirds* 32:64-72.

- Hecht, A. and S.M. Melvin. 2009b. Expenditures and effort associated with recovery of breeding Atlantic Coast piping plovers. *Journal of Wildlife Management* 73:1099-1107.
- Hecht, A., K.F. Robinson, E.E. Osnas, J. Cohen, A.J. Tyre, D. Brinker, C. Davis, M. Hake, L. Johnson, E. King, A. Kocek, B. Maslo, S. Melvin, T. Pover, L.M. Zitske, D.C. Brewer and F. Johnson. 2014. Balancing demographic benefits and risks of using predator exclosures on U.S. Atlantic Coast piping plover nests: A case study from the structured decision making workshop, December 10-13, 2013, National Conservation Training Center, Shepherdstown, WV.
- Houghton, L.M. 2005. Piping plover population dynamics and effects of beach management practices on piping plovers at West Hampton Dunes and Westhampton Beach, New York. Ph.D. Dissertation. Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Jones, K. 1997. Piping plover habitat selection, home range, and reproductive success at Cape Cod National Seashore, Massachusetts. National Park Service Technical Report NPS/NESO-RNR/NRTR/97-03.
- Lauro, B. and J. Tanacredi. 2002. An examination of predatory pressures on piping plovers nesting at Breezy Point, New York. *Waterbirds* 25: 401-409.
- Loefering, J.P. 1992. Piping plover breeding biology, foraging ecology, and behavior on Assateague Island National Seashore, Maryland. M.S. Thesis. Virginia Polytechnic Institute and State University, Blacksburg, VA.
- MacIvor, L.H., C.R. Griffin and S.M. Melvin. 1987. Management, habitat selection, and population dynamics of piping plovers on outer Cape Cod Massachusetts; 1985-1987. Submitted to National Park Service, Cape Cod National Seashore, South Wellfleet, MA.
- Massachusetts Division of Fisheries and Wildlife. 1993. Guidelines for managing recreational use of beaches to protect piping plovers, terns, and their habitats in Massachusetts. Natural Heritage and Endangered Species Program, Field Headquarters, Westborough, MA.
- Melvin, S.M., A. Hecht and C.R. Griffin. 1994. Piping plover mortalities caused by off-road vehicles on Atlantic Coast beaches. *Wildlife Society Bulletin* 22: 409-414.
- Melvin, S.M. and C.S. Mostello. 2003. Summary of 2002 Massachusetts piping plover census data. Massachusetts Division of Fisheries and Wildlife, Westborough, Massachusetts.
- Miller, M.P., S.M. Haig, C.L. Gratto-Trevor and T.D. Mullins. 2010. Subspecies status and population genetic structure in piping plover (*Charadrius melodus*). *Auk* 127:57-71.
- Mostello, C.S. and S.M. Melvin. 2002. Summary of 2001 Massachusetts piping plover census data. Massachusetts Division of Fisheries and Wildlife, Westborough, Massachusetts.

- Murphy, R.K., I.M. G. Michaud, D.R.C. Prescott, J.S. Ivan, B.J. Anderson and M.L. French-Pombier. 2003. Predation on adult piping plovers at predator exclosure cages. *Waterbirds* 26:150–155.
- National Park Service. 2007. Finding of no significant impact, proposed update of the 1992 management plan for the threatened piping plover. Gateway National Recreation Area, Sandy Hook Unit, New Jersey.
- Neuman, K.K., G.W. Page, L.E. Stenzel, J.C. Warriner and J.S. Warriner. 2004. Effect of mammalian predator management on snowy plover breeding success. *Waterbirds*. 27:257–263.
- Schaffer, M.L. and B.A. Stein. 2000. Safeguarding our precious heritage. Pages 301–321 in B.A. Stein, L.S. Kutner, and J.S. Adams, eds. *Precious Heritage: The Status of Biodiversity in the United States*. Oxford University Press.
- Seymour, A. S., S. Harris and P. C. L. White. 2004. Potential effects of reserve size on incidental nest predation by red foxes *Vulpes vulpes*. *Ecological Modelling* 175:101–114.
- Strauss, E. 1990. Reproductive success, life history patterns, and behavioral variation in populations of piping plovers subjected to human disturbance (1982-1989). Ph.D. Dissertation. Tufts University, Medford, MA.
- Thomas, C.D. 1994. Extinction, colonization, and metapopulations: environmental tracking by rare species. *Conservation Biology* 8:373-378.
- U.S. Department of Agriculture (USDA). 2006. Management of predators on Plymouth Long Beach, Plymouth, Massachusetts to benefit breeding coastal waterbirds, January 2006-July 2006. Report to Goldenrod Foundation and Massachusetts Division of Fisheries and Wildlife. Wildlife Services, Amherst, MA.
- USDA. 2008. Reducing the effects of predation on nesting piping plovers and least terns at selected beaches in southern Maine, 2008 final report. Wildlife Services, Augusta, ME.
- U.S. Fish and Wildlife Service. (USFWS). 1994. Guidelines for managing recreational activities in piping plover breeding habitat on the U. S. Atlantic Coast to avoid take under section 9 of the Endangered Species Act. Northeast Region, Hadley, MA.
- USFWS. 1996. Piping Plover (*Charadrius melodus*), Atlantic Coast population, revised recovery plan. Northeast Region, Hadley, MA.
- USFWS. 2007. Chincoteague National Wildlife Refuge, 2007 annual piping plover and beach nesting bird report. Chincoteague, VA.

- USFWS. 2009. Piping plover (*Charadrius melodus*) 5-year review: summary and evaluation. Northeast Region, Hadley, MA and the Midwest Region's East Lansing Field Office, MI.
- USFWS. 2012. Comprehensive conservation strategy for the piping plover (*Charadrius melodus*) in its coastal migration and wintering range in the continental United States. East Lansing, Michigan.
- USFWS. 2015. Addendum regarding timing of management to protect unfledged chicks, guidelines for managing recreational activities in piping plover breeding habitat on the U.S. Atlantic coast to avoid take under section 9 of the Endangered Species Act. Northeast Region, Hadley, MA.
- USFWS and National Marine Fisheries Service. 1998. Endangered Species Consultation Handbook.
- USFWS and National Oceanic and Atmospheric Administration, Massachusetts Executive Office of Energy and Environmental Affairs, and Rhode Island Department of Environmental Management. 2012. Final restoration plan and environmental assessment for piping plover (*Charadrius melodus*) impacted by the Bouchard Barge 120 oil spill, Buzzards Bay Massachusetts and Rhode Island. December, 2012.
- Vashon, A.D. 2014. Electronic mail dated 30 October, 2014 from Adam D. Vashon, Wildlife Services, USDA, Maine to Anne Hecht, USFWS Northeast Region, providing information about results of predator removal in Maine.
- Wilcox, L. 1959. A twenty year banding study of the piping plover. Auk 76: 129-152.